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FROM: GARY P. OAKESON

TRANSMITTED BY: BRENDA WISEMAN

OUR DOCKET No.: 200210053-1

FOR: METHODS OF FORMING ELECTRICALLY CONDUCTIVE PATHWAYS USING  
PALLADIUM ALIPHATIC AMINE COMPLEXES

SUBJECT: REPLY BRIEF UNDER C.F.R. § 41.41

Commissioner For Patents  
PO Box 1450  
Alexandria, VA 22313-1450

Dear Sir/Madam:

Attached please find a Reply Brief under 37 C.F.R. § 41.41 for Docket No. 200210053-1, Application No. 10/618,522.

Thank you. We await your confirmation of receipt.

Respectfully submitted,

Gary P. Oakeson  
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PATENT APPLICATION

HEWLETT-PACKARD COMPANY  
Intellectual Property Administration  
P.O. Box 272400  
Fort Collins, Colorado 80527-2400ATTORNEY DOCKET NO. 200210053-1**IN THE  
UNITED STATES PATENT AND TRADEMARK OFFICE**Inventor(s): Tom Etheridge  
Application No.: 10/618,522  
Filing Date: 07/11/2003Confirmation No.: 5065  
Examiner: Brian K. Talbot  
Group Art Unit: 1792Title: **METHODS OF FORMING ELECTRICALLY CONDUCTIVE PATHWAYS USING PALLADIUM ALIPHATIC  
AMINE COMPLEXES**Mail Stop Appeal Brief - Patents  
Commissioner For Patents  
PO Box 1450  
Alexandria, VA 22313-1450**TRANSMITTAL OF REPLY BRIEF**Transmitted herewith is the Reply Brief with respect to the Examiner's Answer mailed on 10/11/2007.  
This Reply Brief is being filed pursuant to 37 CFR 1.193(b) within two months of the date of the Examiner's Answer.

(Note: Extensions of time are not allowed under 37 CFR 1.136(a))

(Note: Failure to file a Reply Brief will result in dismissal of the Appeal as to the claims made subject to an expressly  
stated new ground rejection.)

No fee is required for filing of this Reply Brief.

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Respectfully submitted,

Tom Etheridge

By Gary P. Oakeson

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**REPLY BRIEF  
DOCKET NO. 200210053-1**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

<b>APPELLANT:</b>	Tom Etheridge	<p align="center"><b><u>CERTIFICATE OF TRANSMISSION</u></b> <b><u>UNDER 37 C.F.R. § 1.8</u></b></p> <p>DATE OF DEPOSIT: December 6, 2007</p> <p>I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being facsimile transmitted to the USPTO or being deposited with the United States Postal Service under 37 C.F.R. § 1.8 on the date indicated above and is addressed to: Commissioner for Patents, P.O. Box 1450 Alexandria, VA 22313.</p> <p><i>Brenda Wiseman</i> Brenda Wiseman</p>
<b>SERIAL NO:</b>	10/618,522	
<b>FILED:</b>	July 11, 2003	
<b>FOR:</b>	METHODS OF FORMING ELECTRICALLY CONDUCTIVE PATHWAYS USING PALLADIUM ALIPHATIC AMINE COMPLEXES	
<b>ART UNIT:</b>	1762	
<b>EXAMINER:</b>	Brian K. Talbot	
<b>DOCKET NO.:</b>	200210053-1	

**APPELLANTS' REPLY BRIEF UNDER 37 C.F.R. § 41.41**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450  
Mail Stop Appeal Brief - Patents

Dear Sir:

Appellants submit this reply brief in response to the Examiner's Answer mailed October 11, 2007, in the Appeal from the final rejection of the Patent Office, mailed September 25, 2006, in the above-identified application.

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I. REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

## II. RELATED APPEALS AND INTERFERENCES

Appellants and Appellants' legal representatives know of no other appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

### III. STATUS OF CLAIMS

Claims 9-25 and 35 remain pending. Claims 26-27 have been withdrawn from consideration and claims 1-8 and 28-34 have been canceled. Thus, the claims on appeal in this application are claims 9-25 and 35, which constitute all of the claims presently pending for consideration.

**IV. STATUS OF AMENDMENTS**

No amendments to pending claims 9-25 and 35 have been made since the Office Action mailed on September 25, 2006, which was the final rejection of the pending claims.



V. SUMMARY OF CLAIMED SUBJECT MATTER

9. (previously presented) A method of forming an electrically conductive pathway, comprising steps of:

- a) jetting a first ink-jetable composition onto a substrate, said first composition including a first liquid vehicle and a palladium aliphatic amine complex solvated therein;
- b) overprinting or underprinting a second composition with respect to at least a portion of the first ink-jetable composition to form a predetermined pattern, said second composition including a second liquid vehicle and reducing agent solvated therein; and
- c) applying heat to the predetermined pattern sufficient to cause reaction between the reducing agent and the palladium aliphatic amine complex to form palladium metal without substantially altering the substrate.

In summary, the invention claimed in independent claim 9 provides for a method of forming an electrically conductive pathway. The method includes jetting a first ink-jetable composition onto a substrate. Page 2, line 18; page 6, lines 2-16; and page 8, lines 26-31. The first composition includes a first liquid vehicle and a palladium aliphatic amine complex solvated therein. Page 2, lines 19-20; page 3, line 21 – page 4, line 7; page 4, lines 12-15; and page 5, line 1 – page 8, line 23. The method also includes overprinting or underprinting a second composition with respect to at least a portion of the first composition so as to form a predetermined pattern. Page 2, lines 20-22; page 9, lines 2-12 and lines 28-31; and page 18, line 29 -- page 19, line 2. The second composition includes a second liquid vehicle and a reducing agent solvated therein. Page 2, lines 20-22; page 3, lines 21-29; page 4, lines 12-15; and page 8,

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line 25 -- page 10, line 30. Heat is then applied to the predetermined pattern in an amount sufficient to cause reaction between the reducing agent and the palladium aliphatic amine complex to form palladium metal without substantially altering the substrate. Page 2, lines 22-25; page 9, lines 7-9; and page 10, lines 10-25.

VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL

The issue presented for review is: whether claims 9-25 and 35 are unpatentable under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 3,896,252 (hereinafter "Tuttle") or U.S. Patent No. 4,285,991 (hereinafter "Gedrat") in combination with U.S. Patent No. 4,668,533 (hereinafter "Miller").

## VII. ARGUMENT

### A. Response to Arguments in Examiner's Answer

The arguments set forth in this Reply Brief are provided in direct response to the arguments set forth in the Examiner's Answer mailed October 11, 2007. Therefore, any arguments presented by Appellant over the prosecution of the present application or in Appellant's Appeal Brief but not repeated here are not to be construed as disavowed or withdrawn by Appellant absent an explicit statement to the contrary.

In the Appeal Brief mailed July 11, 2007, Appellant argued against the combination of Tuttle or Gedrat with Miller asserted by the Examiner as basis for the rejection. In doing so, Appellant pointed to at least five (5) modifications or steps that would be required to arrive at Appellant's invention from the three references cited as basis for the rejection. Appellant further discussed each of these modifications or steps in turn, pointing out the failure of the references to provide the requisite teaching, suggestion, or motivation for each. In the Answer mailed October 11, 2007, the Examiner responded to each of the steps discussed. Presented in turn below are Appellant's responses to the Examiner's points raised with regard to each needed modification or step.

#### 1. Motivation to combine the references is needed

Appellant argued that Tuttle and Gedrat each fail to supply a motivation to combine their teachings with the ink-jetting taught in Miller. In the Answer, the Examiner disagreed, asserting that "Gedrat...teaches a masking and etching step to ultimately form a patterned coating." Examiner's Answer, pg 5, lines 8-10. The Examiner further asserted that combining Gedrat with Miller "would eliminate these costly steps." Regarding Tuttle, the Examiner argued that the

combination of Tuttle and Miller would suggest that one could use the composition of Tuttle and process of Miller to form printed circuitry. The Examiner based the alleged expectation of success for this combination on that "they both are related to forming metal layers on polymer substrates." Pg 5, lines 12-17.

With regard to Tuttle and Miller, Applicant asserts that these references provide no motivation or other apparent reason to combine a coating process for rubber modified thermoplastic polymer with an ink-jet method as in Miller to form printed circuitry. In view of Tuttle, which is directed to coating large areas with metal, one skilled in the art would not look to an ink-jet process that would be highly inefficient for such a purpose. Such motivation, or even common sense approach, would only arise from the perspective of hindsight with respect to Appellant's disclosure. As such, these references are not properly combinable to support a *prima facie* case of obviousness. Furthermore, even if combined, such a combination would not yield Appellant's invention, which requires the ink-jetting of a composition containing a palladium aliphatic amine complex. Neither Tuttle nor Miller teaches such a composition. Rather, Tuttle teaches applying an ethylenediamine or diaminopropane solution for the purpose of aminating the rubber modified surface, followed by application of metal. Miller teaches ink-jetting of palladium as a salt or otherwise non-complexed form. Therefore, such a combination, even if valid, would not render Appellant's invention obvious.

With regard to the combination of Gedrat and Miller, Appellant submits that Gedrat is similar to Tuttle in teaching the coating of an entire surface with a palladium composition. The patterned metal pathways in Gedrat are then created on the surface by a masking and etching step followed by a metal bath. However, combining this process with Miller would not yield

Appellant's invention, because neither teaches ink-jetting of a composition containing a palladium aliphatic amine complex as required by Appellant's invention.

2. Particular materials must be chosen

In the Appeal Brief, Appellant argued that arriving at the palladium aliphatic amine complex of Appellant's invention based upon the asserted combination of references would require one to choose from the many components listed. The Examiner responded with the assertion that one skilled in the art would have a reasonable expectation of success in achieving the complex through any number of steps as long as "a metal and amine complex are combined prior to reducing the metal complex." Examiner's Answer, pg 6, lines 1-4. In response, Appellant points out again that neither Gedrat nor Tuttle provide a teaching or suggestion that would lead one to a palladium aliphatic amine complex. In Tuttle, the specialized surface must be prepared by amination with a solution of ethylenediamine or 1,3-diaminopropane. See col. 3, lines 10-11. Only after completion of this step is the surface treated with metal. Contrary to the Examiner's assertions, the separate application of these components is a significant difference from the claimed invention. In the process of Tuttle, the amines are not provided to complex with palladium. Rather, they are used to modify the substrate. The Examiner's argument is based on the concept that there is no invention in splitting one step into two. However, Appellant submits that the Examiner's rationale is inapposite to the present case, where the "steps" in Tuttle are each directed to different ends and would not yield the complex required by Appellant's invention.

With regard to Gedrat, Appellant reiterates that Gedrat exemplifies an activating solution of a "palladium complex like, for example palladium sulfate in 2-aminopyridine". See col. 4, ln. 53-56. The addition of 2-aminopyridine does not create a palladium aliphatic amine complex, as claimed, most notably because pyridine is aromatic and therefore does not meet the aliphatic requirement. As with Tuttle, the Examiner has failed to provide any specific motivation either explicitly in the references or any common sense reasons why someone skilled in the art would make a modification to an aliphatic amine complex absent the teachings of the Appellant's invention.

### 3. A palladium aliphatic amine complex must be created

The Examiner has argued that the cited references teach the palladium aliphatic amine complex of the claimed invention. Specifically, the Examiner asserted that Tuttle teaches the claimed complex and suggests that Appellant has argued the same. On the contrary, Appellant has argued above and in the Appeal Brief that Tuttle does not teach the palladium aliphatic amine complex required by Appellant's invention. Tuttle teaches two separate steps of treating a substrate with ethylenediamine or 1,3-diaminopropane solution and of applying metal. As explained above, the aminating solution treatment in Tuttle is directed to improving the adherence of the rubber modified thermoplastic polymer substrate. Tuttle teaches that amination of the surface forms salts of the acid groups and halfamide and/or halfamide salts of the anhydride groups presented by this surface. See col. 3, lines 25-27. Complexation of a metal such as palladium with the amines in the solution, were it to occur, would interfere with the amination of the surface. As a result, adherence would be reduced and the stated objectives of

improving adherence would be impeded. Tuttle therefore teaches against such complexation, as this would render the surface treatment step ineffective and superfluous.

Regarding Gedrat, Applicant reiterates the failure of that reference to teach a palladium aliphatic amine complex. Rather Gedrat teaches a 2-aminopyridine complex with palladium sulfate. The Examiner has taken the position that one skilled in the art would have had a reasonable expectation of achieving similar success "regardless of the type of palladium complex used." Examiner's Answer, pg. 6, lines 17-20. Appellant submits that such an assertion is unfounded, particularly given the wide variety of possible amine complexing agents. It appears that the Examiner is asserting purported chemical structural similarity as a basis for this rejection.

Appellant points out that predictability of the technology and the number of species encompassed are relevant to such obviousness rejections. See MPEP 2144.08. Appellant submits that there is sufficient unpredictability with regard to such a large assortment of complexes to refute a finding of obviousness. This is particularly evident when one considers that the claimed complex is ink-jettable. Appellant's specification teaches of characteristics of aliphatic amine complexing agents (e.g. a wide range of pH stabilities) that render them suitable for ink-jet applications. See pg. 5, line 28 to pg. 6, line 5. An asserted equivalent complex must also exhibit such characteristics and be jettable to produce results similar to the claimed complex.

The Examiner has shown no basis in the references for an assertion that any and all types of palladium complexes would yield similar results as a palladium aliphatic amine complex when utilized as claimed in Appellant's invention.



4. The composition must be ink-jettable

The Examiner has contended that one skilled in the art would have a reasonable expectation of achieving similar success with the compositions of Tuttle or Gedrat, based on the teaching of ink-jetting in Miller. The deficiencies in rationales based on equivalent jettable are addressed in the arguments presented in the previous item, which are hereby incorporated herein.

Furthermore, Appellant reiterates that Tuttle teaches away from ink-jetting of a palladium aliphatic amine complex, in that the aminating solution and palladium are taught as separate components involved in separate steps. Appellant submits that, for at least the reasons stated, one skilled in the art would not have a reasonable expectation of success without recourse to Appellant's disclosure.

5. The step of heating must be added

Appellant's invention as claimed requires the step of heating the pattern. Without this step, palladium metal may remain complexed and in solution, resulting in incomplete reduction and deposition of a conductive pathway. None of the cited references teaches a heating step. The Examiner has argued that that similar success would be expected regardless of the application of the step of heating. Appellant reiterates that the references do not expressly or implicitly teach this step. Furthermore, there is no motivation or apparent reason for adding such a step. Regardless, the addition of heating is only one of at least five modification steps required to arrive at the claimed invention through significant reconstruction of the cited references. Taking the invention as a whole, including the complex recited and other claimed components and steps, the heating step is required by Appellant's as set forth in the claims on appeal.

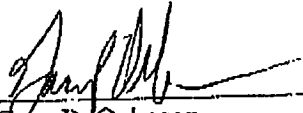
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Appellant submits that, where the references fail to teach all of the other recited limitations, a further showing of criticality is not needed to demonstrate the lack of a *prima facie* case for obviousness of the claims.

B. Conclusion

In conclusion, Appellants respectfully submit that the claims on appeal set forth in the Appendix are patentably distinct from the asserted prior art references. For the reasons stated in this Reply Brief and in the Appeal Brief, reversal of the Examiner's rejection is requested.

Dated this 6<sup>th</sup> day of December, 2007.

  
\_\_\_\_\_  
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VIII. CLAIMS APPENDIX

1-8. (canceled)

9. (previously presented) A method of forming an electrically conductive pathway, comprising steps of:

- a) jetting a first ink-jettable composition onto a substrate, said first composition including a first liquid vehicle and a palladium aliphatic amine complex solvated therein;
- b) overprinting or underprinting a second composition with respect to at least a portion of the first ink-jettable composition to form a predetermined pattern, said second composition including a second liquid vehicle and reducing agent solvated therein; and
- c) applying heat to the predetermined pattern sufficient to cause reaction between the reducing agent and the palladium aliphatic amine complex to form palladium metal without substantially altering the substrate.

10. (original) The method of claim 9, further comprising depositing a conductive metal onto the palladium metal.

11. (original) The method of claim 10, wherein the conductive metal is selected from the group consisting of copper, gold, palladium, nickel, silver, rhodium, platinum, Co-Fe-B, Co-Ni-P, Co-Ni-Fe-B, Ni-Co, and mixtures or alloys thereof.

12. (original) The method of claim 10, wherein the step of depositing is an electroless deposition process.

13. (original) The method of claim 10, wherein the predetermined pattern is a non-continuous pattern of palladium aliphatic amine complex which, once reduced, is a seed for deposition of the conductive metal.

14. (original) The method of claim 9, wherein the second composition is underprinted with respect to the first ink-jettable composition.

15. (original) The method of claim 9, wherein the second composition is overprinted with respect to the first ink-jettable composition.

16. (original) The method of claim 9, wherein the aliphatic amine of the palladium aliphatic amine complex is selected from the group consisting of diamine alkanes, triamine alkanes, and mixtures thereof.

17. (original) The method of claim 16, wherein the aliphatic amine is 1,2-diaminopropane.

18. (original) The method of claim 9, wherein the substrate comprises a member selected from the group consisting of ceramics, polymers, cellulose, silicon, and mixtures thereof.

19. (original) The method of claim 9, wherein the step of applying the second composition is by ink-jetting, said second composition being ink-jettable.

20. (original) The method of claim 9, wherein the second composition further comprises a colorant.

21. (original) The method of claim 9, wherein the first composition further comprises a colorant.

22. (original) The method of claim 9, wherein the reducing agent is selected from the group consisting of formic acid, esters of formic acid, formic acid derivatives, hydrazine, alkali metal borohydride, oxalic acid, alkali or alkaline earth sulfites, and mixtures thereof.

23. (original) The method of claim 22, wherein the reducing agent is formic acid.

24. (original) The method of claim 9, wherein the step of applying heat occurs at from about 50° C to about 80° C.

25. (original) The method of claim 9, wherein the predetermined pattern is a circuit.

26. (withdrawn) A substrate having a circuit formed thereon, said circuit prepared by the method of claim 9,

27. (withdrawn) A substrate having a circuit formed thereon, said circuit prepared by the method of claim 10.

28.-34. (canceled)

35. (new) The method of claim 9, wherein the first liquid vehicle further comprises non-complexed amine.

**IX. EVIDENCE APPENDIX**

(No matter presented)

X. RELATED PROCEEDINGS APPENDIX

(No matter presented)